

Cardiac endocardial left atrial substrate and lesion depth mapping using near-infrared spectroscopy: supplement

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Cardiac endocardial left atrial substrate mapping and lesion depth assessment using near-infrared spectroscopy and machine learning: supplemental document

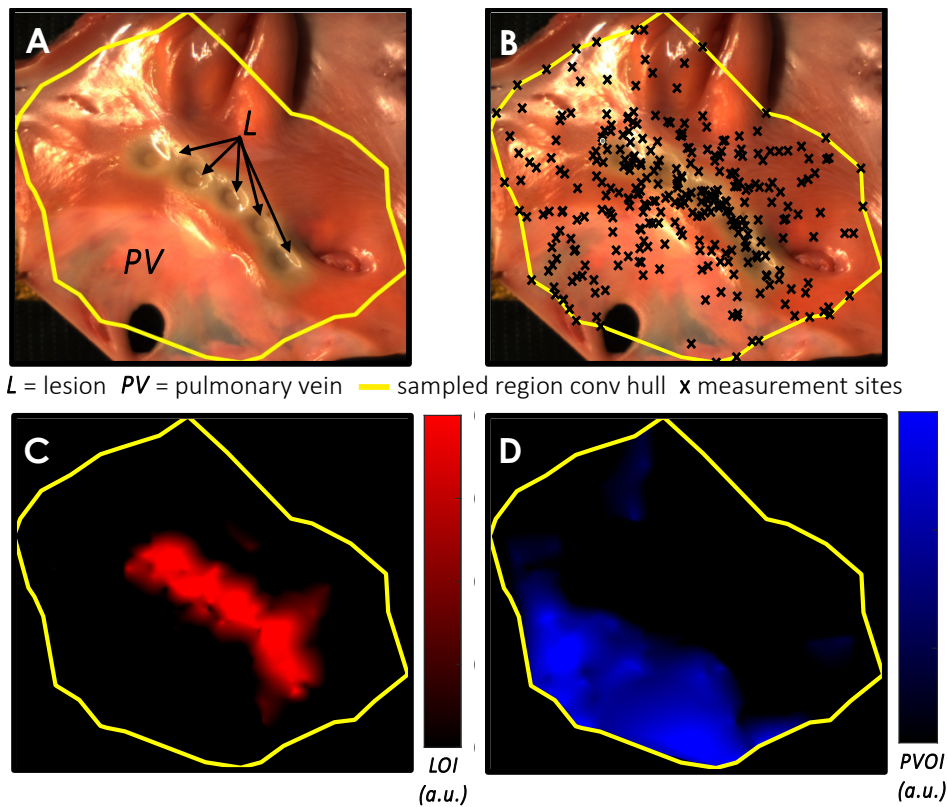


Fig. S1. Swine left atrium spatial distribution maps of LOI and PVOI from interpolated NIRS measurements. Five irrigated lesions were crated in a line near the veno-atrial junctions. A: Raw reference left atrium image captured by CCD camera. B: Total of 330 measurement points were tracked by the camera, and measurement sites are marked on the reference image. C: Spatial distribution of lesion optical index (LOI) map is shown with structured grid enclosed by the convex hull (yellow line). Lesion locations were well-defined in the LOI map ($LOI > 0.2$). LOI values at the lesion centers were higher compared to the boundaries. D: Spatial distribution of pulmonary vein optical index (PVOI) map. As the venous media approached normal myocardium, PVOI values decreased ($PVOI < 0.9$) and rendered a fading boundary.

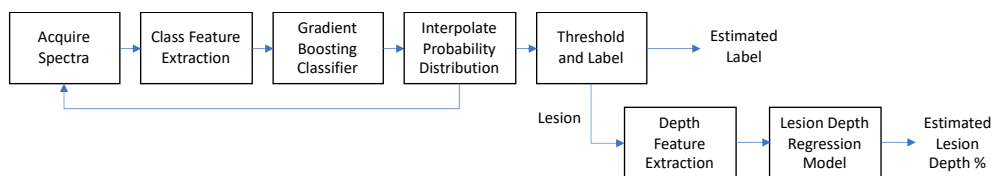


Fig. S2. Classification and lesion depth regression algorithm flow chart. Acquired spectra is calibrated and optical indices are determined from observed spectral signatures. Gradient

boosting classifier was trained with these contrast parameters are inputted into gradient boosting classifier and the predicted probability distributions are interpolated. Highest probability is selected for final classification. Gaussian regression model from previous chapter with a few additional optical indices established in the previous sections was implemented to estimate lesion depth percentage.

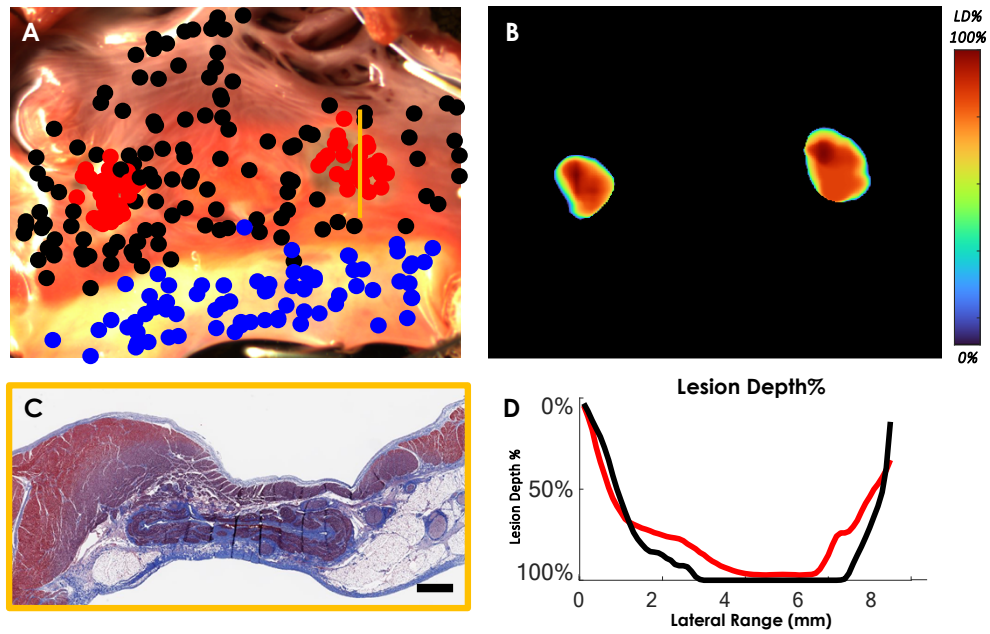


Fig. S3. Lesion depth percentage assessment in swine left atrium. A: shows classification results of NIRS sampled sites from gradient boosting model (blue = pulmonary vein, red = lesion, black = normal myocardium). B: Regression results of lesion depth percentage. Two lesion sets are shown with 100% transmural lesions with gaps at the peripheries. C: Trichrome histology confirms deep transmural lesions with gaps at the peripheries. D: Overlay of estimated (red) and actual lesion depth percentage (black) measurements.